

## Closing the digital divide under different initial conditions

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ferred to as the 'Top Cited' list.) The results of the analysis are summarized in Table 1. The same countries grouped into regions are also shown in Table 1.

Among the 13 countries selected for the study, the United States published the largest number of papers, and also had the largest number of papers in the top 1% of cited papers, with 1.87% in the 'Top Cited' papers list. Among the countries with more than 1% of their papers in the Top Cited list were England (1.53%), Canada (1.34%), Germany (1.27%), Australia (1.13%), France (1.11%) and Italy (1.04%).

All the Asian countries (including Japan which was ranked second in terms of papers published) had less than 1% of their papers in the Top Cited list. In terms of rank by percentage of their papers in the Top Cited list, the Asian countries were at 9 (Japan), 10 (China), 11 (South Korea),

12 (Taiwan) and 13 (India); whereas their corresponding ranks in terms of papers published were 2 (Japan), 6 (China), 11 (India), 12 (South Korea) and 13 (Taiwan).

From the analysis it appears that language plays a part in citations received. Relatively speaking, more papers from English-speaking countries make it to the Top Cited list. Countries that improved their ranking from the 'papers published' list (Column 1, Table 1) to the 'top cited' list (Column 6, Table 1) by at least two positions were England (two places), Canada (four places) and Australia (five places). European countries whose ranks fell by one position between the two lists were Germany and France, while Italy and Spain improved their ranks by one position each. Ranks of all Asian countries fell by 2–7 positions (if we neglect

a change of rank by a single position for Taiwan and South Korea).

India ranked 11th in terms of papers, and 13th in terms of percentage of papers in the Top Cited list among 13 countries. Unfortunately, in spite of the language of higher instruction being English, and practically all publications by Indian authors in the *WoS* likely to be in English, India has the lowest proportion of papers in the top cited list. Some introspection and action are urgently required.

1. King, C., *Science Watch*, May/June 2007, 18.

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## Closing the digital divide under different initial conditions

The recent evidence that the digital divide between rich and poor countries has been declining, was greeted with general enthusiasm by those who are concerned with the potentially negative effects on the latter countries, of lagging continuously behind the former. The emphasis given to these new data by a number of international organizations led to widespread coverage in the media and a sense of optimism about the future, on the part of numerous observers<sup>1</sup>. Indeed, some of them went so far as to argue that 'The most stunning feature of the divide is not about how large it is, but how rapidly it is closing'<sup>2</sup>. In this note by contrast, I view the narrowing digital divide as something that was almost inevitable under the circumstances, rather than as an event of great moment. I suggest furthermore that the pace of the decline is heavily rooted in the extent of the difference in initial conditions between the two groups of countries. In particular, what the existing literature fails to take into account is the bias conferred on countries whose growth in Internet use begins from an extremely low base. The purpose of this note, accordingly, is to correct for the bias and thereby provide a more balanced perspective on how the digital divide has been closing.

Figure 1 shows Internet users per 100 inhabitants for developed and developing countries<sup>3</sup> over the period 1994–2004.

Measured as the ratio of users in the former (rich country) divided by those in the latter (poor country), the digital divide declined from 73 in 1994 to 8 in 2004. Note, however, that the rapid convergence in this sense occurred from a large difference in initial conditions. Whereas, the developed countries began the period from 2.18 users per 100 inhabitants, the corresponding figure for developing countries was only 0.03. When one takes this difference into account, some decline in the digital divide is almost inevitable. For, from that minute initial level, developing countries would only have needed an increase in the number of users to 0.7 per 100 inhabitants in order to achieve the same percentage growth that occurred in the developed countries over the entire ten-year period shown in Figure 1 (that is, an average of 237% per annum). And in judging the speed of the decline (from 27 to 8), one needs again to take into account the major difference in initial conditions between the two groups of countries.

One way of eliminating this difference is to ask how long it took the developed countries to reach the level of 2.18 users per 100 inhabitants (by 1994) and compare that amount of time with the six years taken by the developing countries to reach the almost identical figure of 2.1 in the year 2000. Evidence for this is unfortunately rather scant, but if one accepts

the commonly held view that the Internet began in the early 90s in the rich countries, then these countries took only half the time needed by the poor countries to achieve the use level mentioned above. The growth rate, that is to say, was roughly twice as high in the former than the latter. Logically, the next way of removing the low-base bias is to start at 2000, the year in which developing countries as a whole reached the starting point of 2.18 users per 100 inhabitants in the developed countries. Between 2000 and 2004, the number of users had increased by slightly more than threefold in the developing countries, as against the eightfold increase achieved for the four years, 1994–1998, in the rich countries. Yet another way of looking at the issue is to examine the growth paths of developing countries with Internet use equal (or close) to 2.18, the level which developed countries had reached by 1994. As shown in Table 1, five countries matched this requirement and their Internet use per 100 inhabitants grew from 2.17 in 1999 to 12.8 in 2005. For their part the developed countries had reached the level of 30.7 over the same number of years after 1994 (see Figure 1).

Translated into differences in average growth, the figures are 82 and 218% for developing and developed countries respectively. (Much the same result holds when a different group of five develop-

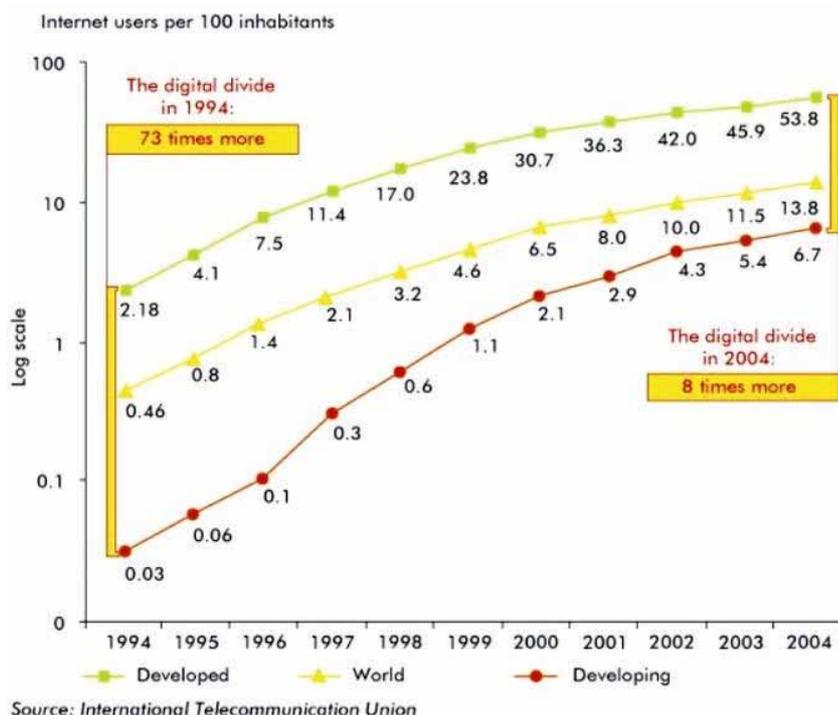


Figure 1. Closing the digital divide.

Table 1. Developing countries with the same starting point as developed countries

Country	Internet users per 100 inhabitants in 1999	Internet users per 100 inhabitants in 2005
Thailand	2.14	11.03
Barbados	2.24	14.07
Brazil	2.04	17.24
Panama	2.19	6.39
Turkey	2.23	15.31
Average	Average = 2.17	Average = 12.8

Source: ITU (ICT eye tables).

ing countries with levels close to 4.1 in 1999 is compared with developed countries at the same level.) The question then becomes as to why the latter grew so fast in relation to the former, rather than why the former have been catching up so rapidly with the latter. It is not a question that has to be posed for each and every latecomer, however. Perhaps

the most telling exception is the case of Korea (a latecomer), which I now briefly review.

The number of Internet users in Korea amounted to 1.6 million in 1997 (3.7% of the population). By 2001, according to most estimates<sup>4</sup>, the number of users had reached a figure of almost 25 million (or 56% of the population). Now, looking

again at Figure 1, it appears that Internet use of 3.7% was achieved in the developed countries between 1994 and 1995, so that subsequent growth in those countries can be compared with what occurred in Korea. The question, in particular, is how long it took the developed countries (from 1994/95) to reach a level of Internet use equal to 56% (the Korean case). And the answer is that this level had not been reached even by 2004, the end of the ten-year period covered in Figure 1. By 2001, in fact, developed countries had reached only 36.3% of the population, indicating just how exceptional the Korean case really was.

In conclusion, writings on the digital divide focus on the growth rates of rich and poor countries with different initial conditions and more specifically on how much faster the latter are growing compared with the former ('the closing divide'). When one corrects for the different starting points, however, developing countries seem to have been growing between two to three times more slowly than the developed countries, though one latecomer country, Korea, stands out as a striking exception to this general pattern.

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## New frogs from the Western Ghats

Criticism to scientific papers should be fertile and should stimulate the researchers to make better future products. Unfortunately the comments by Vasudevan *et al.*<sup>1</sup> to our taxonomic work of frogs<sup>2</sup> (and to those by Biju and Bossuy<sup>3,4</sup>) are

far from fertile and rather disappointing. Most of their arguments are based on misunderstanding, groundless doubt, and excessive demands which are practically impossible to fulfil due to the serious lack of comparable data. Their comments

do not contain positive suggestions which will serve for the progress of frog taxonomy.

First, they criticized that we 'distinguish *Philautus luteolus* from all other known *Philautus* based on colouration